



RESEARCH FACTS

RESEARCH & TECHNOLOGY DEVELOPMENT FOR THE CANADIAN BEEF INDUSTRY



Impact of Zero Till on surface and subsurface water quality

Project Title:

Nutrient and Pathogen Transport Through Agricultural Land Drainage Systems

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Zero till (depositing seed and fertilizer and packing the furrow in one pass) is an increasingly popular method of cultivation for enhancing soil conservation across Canada, including areas of high rainfall where subsurface drainage systems are often installed to remove excess water from the soil. Spreading cattle manure on agricultural land is an established method of disposing of manure and increasing soil fertility.

There has been little research on the effect of spreading this manure on surface and subsurface water on land with drainage systems, however, and this study was undertaken to fill that gap.

A tile drained site in Nova Scotia was designed so that surface and subsurface drainage could be completely collected. Corn was grown on the plots and harvested for silage in each of the three years of the study. The plots were cultivated using either zero till or conventional till methods and solid beef manure was applied in the fall of each year at rates varying between 39 and 50 tonnes per hectare. Drainage water was then measured for nitrate, phosphorus and E.coli bacteria content. Subsurface drainage was greater than surface drainage under both cultivation methods. It also contributed more to nutrient leaching than did surface drainage. The majority of nutrient losses occurred during non-growing seasons (October to April).

Surface drainage was higher on average from conventional till, and subsurface drainage was higher on average from zero till, with the net result being slightly higher combined drainage from zero till. Zero till also lost slightly more nutrients than conventional till, which was attributed to this higher drainage. For nitrate only, drainage from zero till had 20 per cent lower nitrate concentrations than conventional till.

Nitrate concentrations exceeded drinking and freshwater guidelines by five per cent in zero till and 40 per cent in conventional till. E.coli concentrations exceeded drinking and freshwater guidelines by 95 per cent in zero till and 40 per cent in conventional till. Bacterial contamination of water was greatest in the period immediately following manure application and while drainage water is not directly used for drinking water, it can sometimes come into contact and contaminate drinking water sources.

Many studies have confirmed that agricultural drainage is a non-point source of pollution in humid regions. High rainfall regions, such as Nova Scotia, with extensive drainage systems are at risk for nutrient and bacterial contamination of surface and groundwater. This study, which monitored the quality of drainage water in Nova Scotia, provides valuable information for

evaluating the implications of current manure application and drainage practices.

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